

1 This listing of claims will replace all prior versions, and listings, of claims  
2 in the application:

3  
4 Listing of Claims

5 Claim 1 (currently canceled)

6  
7 Claim 2 (currently amended): A method as recited in claim 1, further  
8 comprising:

9 initiating a search for images based on at least one query keyword in a  
10 query;

11 identifying, during the search, first images having associated keywords that  
12 match the query keyword and second images that contain low-level features  
13 similar to those of the first images; and

14 ranking the first and second images.

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16 Claim 3 (currently amended): A method as recited in claim 12, further  
17 comprising presenting the first and second images.

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1 Claim 4 (currently amended): A method ~~as recited in claim 1~~, further  
2 comprising:

3 initiating a search for images based on at least one query keyword in a  
4 query;

5 identifying, during the search, first images having associated keywords that  
6 match the query keyword and second images that contain low-level features  
7 similar to those of the first images;

8 presenting the first and second images to a user; and  
9 monitoring feedback from the user as to which of the first and second  
10 images are relevant to the query.

11  
12 Claim 5 (currently amended): A method ~~as recited in claim 1~~, further  
13 comprising:

14 initiating a search for images based on at least one query keyword in a  
15 query;

16 identifying, during the search, first images having associated keywords that  
17 match the query keyword and second images that contain low-level features  
18 similar to those of the first images;

19 presenting the first and second images to a user;  
20 receiving feedback from the user as to whether the first and second images  
21 are relevant to the query; and

22 learning how the first and second images are identified based on the  
23 feedback from the user.

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1 Claim 6 (currently amended): A method as recited in claim 12, wherein the  
2 monitoring comprises further comprising:

3 presenting the first and second images to a user;  
4 receiving feedback from the user as to whether the first and second images  
5 are relevant to the query; ~~and, further comprising:~~  
6 refining the search to identify additional images that contain low-level  
7 features similar to those of the images indicated by the user as being relevant to the  
8 query.

9  
10 Claim 7 (currently amended): A method as recited in claim 12, wherein the  
11 monitoring comprises further comprising:

12 presenting the first and second images to a user;  
13 receiving feedback from the user as to whether the first and second images  
14 are relevant to the query; ~~and, further comprising:~~  
15 assigning a large weight to an association between the query keyword and  
16 the images deemed relevant by the user.

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18 Claim 8 (original): A method as recited in claim 7, further comprising  
19 grouping the low-level features of the images deemed relevant by the user.  
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1 Claim 9 (currently amended): A method as recited in claim 12, wherein the  
2 monitoring comprises further comprising:

3 presenting the first and second images to a user;  
4 receiving feedback from the user as to whether the first and second images  
5 are relevant to the query; and, further comprising:  
6 assigning a small weight to an association between the query keyword and  
7 the example image.

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9 Claim 10 (original): A method as recited in claim 9, further comprising  
10 identifying additional images with low-level features similar to those of the  
11 example image.

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13 Claim 11 (currently amended): A computer readable medium having  
14 computer-executable instructions that, when executed on a processor, perform the  
15 method as recited in claim 12.

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17 Claim 12 (original): A method comprising:  
18 permitting entry of both keyword-based queries and content-based queries;  
19 finding images using both semantic-based image retrieval and low-level  
20 feature-based image retrieval;  
21 presenting the images to a user so that the user can indicate whether the  
22 images are relevant; and  
23 conducting semantic-based relevance feedback and low-level feature-based  
24 relevance feedback in an integrated fashion.  
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1 Claim 13 (original): A method as recited in claim 12, further comprising  
2 ranking the images.

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4 Claim 14 (original): A method as recited in claim 12, further comprising  
5 using images indicated as being relevant to find additional images.

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7 Claim 15 (original): A computer readable medium having computer-  
8 executable instructions that, when executed on a processor, perform the method as  
9 recited in claim 12.

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11 Claims 16-19 (currently canceled)

12  
13 Claim 20 (original): A method comprising:  
14 presenting a result set of images that are returned from an image retrieval  
15 search of a query having at least one keyword;

16 monitoring feedback from a user as to whether the images in the result set  
17 are relevant to the query;

18 in an event that the user selects at least one image as being relevant to the  
19 query, associating the keyword in the query with the selected image to form a first  
20 keyword-image association and assigning a comparatively large weight to the first  
21 keyword-image association; and

22 in an event that the user identifies an example image for refinement of the  
23 search, associating the keyword in the query with the example image to form a  
24 second keyword-image association and assigning a comparatively small weight to  
25 the second keyword-image association.

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2 Claim 21 (original): A method as recited in claim 20, further comprising  
3 conducting both content-based image retrieval and semantic-based image retrieval.  
4

5 Claim 22 (original): A method as recited in claim 20, further comprising  
6 presenting the result set of images in a user interface, the user interface facilitating  
7 the user feedback by allowing the user to indicate which images are more relevant  
8 and which images are less relevant.  
9

10 Claim 23 (original): A computer readable medium having computer-  
11 executable instructions that, when executed on a processor, perform the method as  
12 recited in claim 20.  
13

14 Claim 24 (previously amended): A method comprising:  
15 computing, for each category, a representative feature vectors of a set of  
16 existing images within the category;  
17 determining a set of representative keywords that are associated with the  
18 existing images in each category;  
19 comparing, for each new image, the low-level feature vectors of the new  
20 image to the representative feature vectors of the existing images in each category  
21 to identify a closest matching category; and  
22 labeling the new image with the set of representative keywords associated  
23 with the closest matching category.  
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1 Claim 25 (currently amended): A method as recited in claim 24, further  
2 comprising using user feedback to selectively add and/or remove keywords from  
3 the new image.

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5 Claim 26 (original): A method as recited in claim 24, further comprising:  
6 placing the labeled new images into a holding category;  
7 evaluating the labeled new images in the holding category to determine if  
8 any of the keywords associated with the labeled new image match the  
9 representative keywords from each category; and  
10 assigning the labeled new image to the category that best matches the  
11 keywords associated with the labeled new image.

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13 Claim 27 (currently canceled):

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15 Claim 28 (currently amended): An image retrieval system as recited in  
16 ~~claim 27, comprising:~~

17 a query handler to handle both keyword-based queries having one or more  
18 search keywords and content-based queries having one or more low-level features  
19 of an image; and

20 a feature and semantic matcher to identify at least one of (1) first images  
21 having keywords that match the search keywords from a keyword-based query, and  
22 (2) second images having low-level features similar to the low-level features of a  
23 content-based query, wherein the feature and semantic matcher ranks the images.  
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1 Claim 29 (currently amended): An image retrieval system as recited in  
2 claim 278, wherein the query handler comprises a natural language parser.

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4 Claim 30 (currently amended): An image retrieval system as recited in  
5 claim 278, wherein the query handler comprises:

6 a parser to parse text-based queries; and

7 a concept hierarchy to define various categories of images.

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9 Claim 31 (currently amended): An image retrieval system as recited in  
10 claim 278, further comprising a user interface to present the images identified by  
11 the feature and semantic matcher.



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1 Claim 32 (currently amended): An image retrieval system ~~as recited in~~  
2 ~~claim 27~~, comprising:

3 a query handler to handle both keyword-based queries having one or more  
4 search keywords and content-based queries having one or more low-level features  
5 of an image;

6 a feature and semantic matcher to identify at least one of (1) first images  
7 having keywords that match the search keywords from a keyword-based query, and  
8 (2) second images having low-level features similar to the low-level features of a  
9 content-based query;

10 a user interface to present the images identified by the feature and semantic  
11 matcher to a user, the user interface allowing the user to indicate whether the  
12 images are relevant to the query; and

13 a feedback analyzer to train the image retrieval system based on user  
14 feedback as to relevancy.

15  
16 Claim 33 (currently amended): An image retrieval system as recited in  
17 claim 27, further comprising:

18 a user interface to present the images identified by the feature and semantic  
19 matcher to a user, the user interface allowing the user to identify an example  
20 image; and

21 the feature and semantic matcher being configured to identify additional  
22 images that contain low-level features similar to those of the example image.

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1 Claim 34 (currently amended): An image retrieval system as recited in  
2 claim 278, further comprising:

3 a user interface to present the images identified by the feature and semantic  
4 matcher to a user, the user interface allowing the user to identify which images are  
5 relevant to a particular search query; and

6 a feedback analyzer to assign a large weight to an association between the  
7 search keywords and the images identified as relevant by the user.

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9 Claim 35 (original): An image retrieval system as recited in claim 34,  
10 wherein the feedback analyzer groups the low-level features of the images  
11 identified as relevant by the user.

12  
13 Claim 36 (currently amended): An image retrieval system as recited in  
14 claim 278, further comprising:

15 a user interface to present the images identified by the feature and semantic  
16 matcher to a user, the user interface allowing the user to identify an example image  
17 as being less relevant or irrelevant to the query; and

18 a feedback analyzer to assign a small weight to an association between the  
19 search keywords and the example image.

20  
21 Claim 37 (original): An image retrieval system as recited in claim 36,  
22 wherein the feature and semantic matcher identifies additional images with low-  
23 level features similar to those of the example image.

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1 Claim 38 (original): A database structure stored on one or more computer-  
2 readable media comprising:  
3 multiple image files;  
4 multiple keywords; and  
5 a semantic network to associate the keywords with the image files, the  
6 semantic network defining individual keyword-image links that associate a  
7 particular keyword with a particular image file, each keyword-image link having a  
8 weight indicative of how relevant the particular keyword is to the particular image  
9 file.

11 Claim 39 (currently amended): A computer-readable medium having  
12 computer-executable instructions that, when executed, directs a computer to:  
13 find images using both semantic-based image retrieval and low-level  
14 feature-based image retrieval;  
15 present the images to a user so that the user can indicate whether the images  
16 are relevant; and  
17 concurrently conduct semantic-based relevance feedback and low-level  
18 feature-based relevance feedback.

20 Claim 40 (original): A program as recited in claim 39, further comprising  
21 computer-executable instructions that, when executed, direct a computer to rank  
22 the images.

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1 Claim 41 (original): An information retrieval program, embodied on the  
2 computer-readable medium, comprising the computer-executable instructions of  
3 claim 39.

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5 Claim 42 (currently added): A computer readable medium having  
6 computer-executable instructions that, when executed on a processor, perform the  
7 method as recited in claim 4.

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